



# TORONTO WORLD SCHOOL

## COURSE OUTLINE

**Department:** SCIENCE

**Course Developer:** Miguel Velasco

**Course Development Date:** May 2023

**Course Reviser/ Revision Date:** Ramandeep Thid

**Course Title/ Grade/ Type:** Biology, Grade 12, University Preparation

**Course Code:** SBI4U

**Credit Value:** 1.0

**Total Hours:** 110 hours

**Policy Document:** The Ontario Curriculum Grades 11 and 12 Science (Revised 2008)

**Prerequisite:** Biology, Grade 11, University Preparation

## **Course Description**

This course provides students with the opportunity for in-depth study of the concepts and processes that occur in biological systems. Students will study theory and conduct investigations in the areas of biochemistry, metabolic processes, molecular genetics, homeostasis, and population dynamics. Emphasis will be placed on the achievement of detailed knowledge and the refinement of skills needed for further study in various branches of the life sciences and related fields.

## **Overall Curriculum Expectations**

### **Scientific Investigation Skills and Career Exploration**

**A.1** – Demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analyzing and interpreting, and communicating)

**A.2** – Identify and describe careers related to the fields of science under study, and describe contributions of scientists, including Canadians, to those fields

### **Biochemistry**

**B.1** – Analyse technological applications of enzymes in some industrial processes, and evaluate technological advances in the field of cellular biology

**B.2** – Investigate the chemical structures, functions, and chemical properties of biological molecules involved in some common cellular processes and biochemical reactions

**B.3** – Demonstrate an understanding of the structures and functions of biological molecules, and the biochemical reactions required to maintain normal cellular functions

### **Metabolic Processes**

**C.1** – Analyze the role of metabolic processes in the functioning of biotic and abiotic systems, and evaluate the importance of an understanding of these processes and related technologies to personal choices made in everyday life

**C.2** – investigate the products of metabolic processes such as cellular respiration and photosynthesis

**C.3** – Demonstrate an understanding of the chemical changes and energy conversions that occur in metabolic processes

### **Molecular Genetic**

**D.1** – Analyze some of the social, ethical and legal issues associated with genetic research and biotechnology

**D.2** – Investigate, through laboratory activities, the structures of cell components and their roles in processes that occur within the cell

**D.3** – Demonstrate an understanding of concepts related to molecular genetics, and how genetic modification is applied in industry and agriculture

### **Homeostasis**

**E.1** –Evaluate the impact on the human body of selected chemical substances and of environmental factors related to human activity

**E.2** – Investigate the feedback mechanism that maintain homeostasis in living organisms

**E.3** – Demonstrate an understanding of the anatomy and physiology of human body systems, and explain the mechanism that enable the body to maintain homeostasis

### **Population Dynamics**

- F.1** – Analyse the relationships between population growth, personal consumption, technological development, and our ecological footprint, and assess the effectiveness of some Canadian initiatives intended to assist expanding populations
- F.2** – Investigate the characteristics of population growth, and use models to calculate the growth of populations within an ecosystem
- F.3** – Demonstrate an understanding of concepts related to population growth, and explain the factors that affect the growth of various populations of species

### **OUTLINE OF COURSE CONTENT**

<b>UNIT</b>	<b>UNIT DESCRIPTION</b>	<b>HOURS</b>
<b>U1: Biochemistry</b>	In this unit, students will learn technological applications that are used in the food, pharmaceutical, and medical industries. Biological molecules and their chemical properties affect cellular processes and biochemical reactions. Biochemical compounds that play important structural and functional roles in cells of all living organisms.	17
<b>U2: Metabolic Processes</b>	In this unit, learn all metabolic processes which involve chemical changes and energy conversions. Understand metabolic processes which enable people to make informed choices with respect to a range of personal, societal, and environmental issues.	18
<b>U3: Molecular Genetics</b>	In this unit, students will learn DNA which contains all the genetic information for any living organism. How proteins control a wide variety of cellular processes. Genetic research and biotechnology that have social, legal, and ethical implications.	26
<b>U4: Homeostasis</b>	In this unit, students will learn about organisms and how they have strict limits on the internal conditions that they can tolerate. Systems that maintain homeostasis rely on feedback mechanisms. Environmental factors which affect homeostasis.	20
<b>U5: Population Dynamics</b>	In this unit, students will learn population growth that follows predictable patterns. Increased consumption of resources and production of waste associated with population growth result in specific stresses that affect Earth's sustainability. Technological developments that can contribute to or help offset the ecological footprint associated with population growth and the consumption of natural resources.	20
<b>Final</b>	Final Evaluation - Culminating Activity Final Evaluation - Exam	9

<b>Total Hours</b>		110
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## **TEACHING STRATEGIES**

<b>Strategies marked with “x” are used in the course.</b>			
Direct Instruction	X	Use of Video and Audio materials	X
Class Activity	X	Teacher modeling	X
Worksheets/Surveys	X	Use of Computers/Internet	X
Individual or Group Research	X	Journaling	X
Conferencing Teacher & Student	X	Reflecting on Strategies	X
Interactive Labs & Simulations	X	Personal Response	X
Silent individual reading	X	Brainstorming	X
Class Activity	X	Editing/Revision	X
Independent Work	X		

### **Strategies for Assessment and Evaluation of Student Performance**

Diagnostic assessment is used at the beginning of a unit to assist in determining a starting point for instruction. Assessment for Learning (AFL) provides information to students as they are learning and refining their skills. Assessment as Learning (AAL) acts as a stepping-stone for students to begin applying their understanding using critical thinking; it bridges the gap between AFL and AOL. Assessment of Learning (AOL), at the end of units and course, provides students with the opportunity to synthesize/apply/demonstrate their learning and the achievement of the expectations. The following is a list of specific assessment/evaluation strategies that the teacher may use but is not limited to.

### **Assessment and Evaluation**

Evaluation in this course will be continuous throughout the year and will include a variety of evaluation methods. The tools highlighted in yellow will be used for the three different types of assessments:

<b>Assessment as Learning</b>	<b>Assessment for Learning</b>	<b>Assessment of Learning</b>
<b>Student Product</b> <input type="checkbox"/> Journals/Letters/Emails (checklist) <input type="checkbox"/> Learning Logs (anecdotal) <input type="checkbox"/> Learning Goals (Checklist) <input type="checkbox"/> Entrance tickets	<b>Student Product</b> <input type="checkbox"/> Assignment <input type="checkbox"/> Journals/Letters/Emails (checklist) <input type="checkbox"/> Pre-tests (scale/rubric) <input type="checkbox"/> Peer feedback (anecdotal/checklist) <input type="checkbox"/> Entrance ticket	<b>Student Product</b> <input type="checkbox"/> Assignment <input type="checkbox"/> Journals/Letters/Emails (checklist) <input type="checkbox"/> Tests (scale/rubric) <input type="checkbox"/> Exam <input type="checkbox"/> Reports (rubric)

<input type="checkbox"/> Exit tickets	<input type="checkbox"/> Vocabulary notebooks (anecdotal)	<input type="checkbox"/> Essays (rubric)
<b>Observation</b> <input type="checkbox"/> Whole class discussions (anecdotal) <input type="checkbox"/> Self-proofreading (checklist)	<b>Observation</b> <input type="checkbox"/> Class discussions (anecdotal) <input type="checkbox"/> Debate (rubric) <input type="checkbox"/> Performance tasks (anecdotal/scale)	<b>Observation</b> <input type="checkbox"/> PowerPoint presentations (rubric) <input type="checkbox"/> Performance tasks (anecdotal/scale)
<b>Conversation</b> <input type="checkbox"/> Student teacher conferences (checklist) <input type="checkbox"/> Small Group Discussions (checklist) <input type="checkbox"/> Pair work (checklist)	<b>Conversation</b> <input type="checkbox"/> Student teacher conferences (checklist) <input type="checkbox"/> Small group discussions (checklist) <input type="checkbox"/> Pair work (anecdotal) <input type="checkbox"/> Peer-feedback (anecdotal) <input type="checkbox"/> Peer-editing (anecdotal) <input type="checkbox"/> Oral pre-tests (scale/rubric)	<b>Conversation</b> <input type="checkbox"/> Student teacher conferences (checklist) <input type="checkbox"/> Question and Answer Session (checklist) <input type="checkbox"/> Oral tests (scale/rubric)

Online Activities (within LMS)	Offline Activities
Watching video lectures Watching additional resource videos Completing interactive activities Communicating with teachers Participating in virtual conferences Completing online quizzes Reviewing peer submissions Submitting all AAL, AFL, & AOL Assessment and Evaluations	Reading materials for the course Reviewing materials for the course Completing assignments Completing practice activities Preparing presentations Reviewing for exams and unit tests Researching topics on the internet Recording and producing presentations Practicing processes and skills Completing proctored unit tests and exams

### The Final Grade:

The percentage grade represents the quality of the students' overall achievement of the expectations for the course and reflects the corresponding achievement as described in the achievement chart for Science. The distribution of marks into a grade is based on the departmental assessment and evaluation guide for the course and will reflect the student's most consistent level of achievement where appropriate. Comments on the development of learning skills and contributions to the course will be provided on reports. Term work will be 70% of the overall grade for the course; the final evaluation will be 30% of the overall grade, incorporating a final written examination and culminating activity at the end of the course.

Assessment and Percentage of Final Mark	
<b>(Term) 70%</b>	Unit 1: Presentation (8%) [OBS] Unit 1: Assignment (7%) [SP/CONV] Unit 1: Test (8%) [SP]
	Unit 2: Conference (7%) [CONV]
	Unit 3: Presentation (8%) [OBS] Unit 3: Test (8%) [SP]
	Unit 4: Assignment (8%) [SP]
	Unit 5: Assignment (8%) [SP] Unit 5: Assignment (8%) [SP]
<b>30%</b>	Final Evaluations - Culminating activity + Exam [SP]

- Each Assessment of Learning (AoL) will be broken into the following categories and given the following weights: Knowledge/Understanding (30%), Inquiry/Thinking (20%), Communication (30%), and Application/Making Connections (20%).

A Summary Description of Achievement in Each Percentage Grade Range and Corresponding Level of Achievement		
Percentage Grade Range	Achievement Level	Summary Description
80-100%	Level 4	A very high to outstanding level of achievement. Achievement is <i>above</i> the provincial standard.
70-79%	Level 3	A high level of achievement. Achievement is <i>at</i> the provincial standard.
60-69%	Level 2	A moderate level of achievement. Achievement is <i>below, but approaching</i> , the provincial standard.

50-59%	Level 1	A passable level of achievement. Achievement is <i>below</i> the provincial standard.
below 50%	Level R	Insufficient achievement of curriculum expectations. A credit will not be granted.

### **Assessment of Learning Skills & Work Habits:**

The following learning skills and work habits will be fostered throughout this course and assessed on the report card: responsibility, organization, independent work, collaboration, initiative, self-regulation. These skills will not be included as part of the final mark unless they are identified in the provincial curriculum expectations for the course. However, it is important to remember that the development of these skills is critical to daily academic success and individual growth.

The following chart indicates the skills and look-fors for each student.

Learning Skills and Work Habits		E – Excellent    G – Good    S – Satisfactory    N – Needs Improvement	
<b>Responsibility</b>		<b>Organization</b>	
<ul style="list-style-type: none"> <li>Fulfills responsibilities and commitments within the learning environment.</li> <li>Completes and submits class work, homework, and assignments according to agreed-upon timelines.</li> <li>Takes responsibility for and manages own behaviour.</li> </ul>		<ul style="list-style-type: none"> <li>Devises and follows a plan and process for completing work and tasks.</li> <li>Establishes priorities and manages time to complete tasks and achieve goals.</li> <li>Identifies, gathers, evaluates, and uses information, technology, and resources to complete tasks.</li> </ul>	
<b>Independent Work</b>		<b>Collaboration</b>	
<ul style="list-style-type: none"> <li>Independently monitors, assesses, and revises plans to complete tasks and meet goals.</li> <li>Uses class time appropriately to complete tasks.</li> <li>Follows instructions with minimal supervision.</li> </ul>		<ul style="list-style-type: none"> <li>Accepts various roles and an equitable share of work in a group.</li> <li>Responds positively to the ideas, opinions, values, and traditions of others.</li> <li>Builds healthy peer-to-peer relationships through personal and media-assisted interactions.</li> <li>Works with others to resolve conflicts and build consensus to achieve group goals.</li> <li>Shares information, resources, and expertise, and promotes critical thinking to solve problems and make decisions.</li> </ul>	
<b>Initiative</b>		<b>Self-Regulation</b>	
<ul style="list-style-type: none"> <li>Looks for and acts on new ideas and opportunities for learning.</li> <li>Demonstrates the capacity for innovation and a willingness to take risks.</li> <li>Demonstrates curiosity and interest in learning.</li> <li>Approaches new tasks with a positive attitude.</li> <li>Recognizes and advocates appropriately for the rights of self and others.</li> </ul>		<ul style="list-style-type: none"> <li>Sets own individual goals and monitors progress towards achieving them.</li> <li>Seeks clarification or assistance when needed.</li> <li>Assesses and reflects critically on own strengths, needs, and interests.</li> <li>Identifies learning opportunities, choices, and strategies to meet personal needs and achieve goals.</li> <li>Perseveres and makes an effort when responding to challenges.</li> </ul>	

The report card will therefore focus on two distinct but related aspects of student achievement; the achievement of curriculum expectations and the development of learning skills. The report card will contain separate sections for the reporting of these two aspects.

### **Program Planning Considerations:**

**English language learners:** As our school can have multilingual student population, special accommodation will be made to bring a rich diversity of background knowledge and experience to the classroom.

TWS courses can provide a wide range of options to address the needs of ESL/ELD students. Assessment and evaluation exercises will help ESL students in mastering the English language. In addition, since all occupations require employees with a wide range of English skills and abilities,

many students will learn how the operation of their own physical world can contribute to their success in their social world. The student whose first language is not English enters Ontario Secondary schools with diverse linguistic and cultural backgrounds. All of these students bring a rich array of background knowledge and experience to the classroom, and all teachers must share in the responsibility for their English-language development. Teachers must incorporate appropriate strategies for instructions and assessment to facilitate the success of the English language learners in their classrooms. These strategies include:

- modification of some or all of the course expectations so that they are challenging but attainable for the learner at his or her present level of English proficiency, given the necessary support from the teacher;
- use of a variety of instructional strategies (e.g., extensive use of visual cues, scaffolding, manipulatives, pictures, diagrams, graphic organizers; attention to clarity of instructions);
- modelling of preferred ways of working in English; previewing of textbooks; pre-teaching of key vocabulary; peer tutoring; strategic use of students' first languages);
- use of a variety of learning resources (e.g., visual material, simplified text, bilingual dictionaries, materials that reflect cultural diversity);
- use of assessment accommodations (e.g., granting of extra time; simplification of language used in problems and instructions; use of oral interviews, learning logs, portfolios, demonstrations, visual representations, and tasks requiring completion of graphic organizers or cloze sentences instead of tasks that depend heavily on proficiency in English).

**Literacy education:** Communication skills are fundamental to the development of literacy. Fostering students' communication skills is an important part of the teacher's role in the curriculum. When students read they need to understand vocabulary and terminology. Students are encouraged to use language with care and precision in order to communicate effectively. Students are encouraged to ask questions to their peers/teachers and to also be proactive with solving their own questions.

**The role of information and communications technology:** Information and communication technologies (ICT) provide a range of tools that can significantly extend and enrich teachers' instructional strategies and support students' learning. Teachers can use ICT tools and resources both for whole-class instruction and to design programs that meet diverse student needs. Technology can help to reduce the time spent on routine tasks, allowing students to devote more of their efforts to thinking and concept development.

Information technology is considered a learning tool that must be accessed by students when the situation is appropriate. As a result, students will develop transferable skills through their experience with word processing, internet research, and presentation software, as would be expected in any environment.

Technology also makes possible simulations of complex systems that can be useful for problem-solving purposes or when field studies on a particular topic are not feasible.

Information and communications technologies can be used in the classroom to connect students to other schools, at home and abroad, and to bring the global community into the local classroom. Although the Internet is a powerful electronic learning tool, there are potential risks attached to its use. All students must be made aware of issues of Internet privacy, safety, and responsible use, as well as of the ways in which this technology is being abused – for example, when it is used to promote hatred.



Teachers, too, will find the various ICT tools useful in their teaching practice, both for whole class instruction and for the design of curriculum units that contain varied approaches to learning to meet diverse student needs.

**Equity and Inclusive Education:** The TWS equity and inclusive education strategy focuses on respecting diversity, promoting inclusive education, and identifying and eliminating discriminatory biases, systemic barriers, and power dynamics that limit the ability of students to learn, grow, and contribute to society. In an environment based on the principles of inclusive education, all students, parents, caregivers, and other members of the school community - regardless of ancestry, culture, ethnicity, sex, physical or intellectual ability, race, religion, gender identity, sexual orientation, socio-economic status, or other similar factors - are welcomed, included, treated fairly, and respected. Diversity is valued, and all members of the TWS community feel safe, comfortable, and accepted. Every student is supported and inspired to succeed in a culture of high expectations for learning. In an inclusive education system, all students see themselves reflected in the curriculum, their physical surroundings, and the broader environment, so that they can feel engaged in and empowered by their learning experiences. In addition, TWS differentiates the instruction and assessment strategies to take into account the background and experiences, as well as the interests, aptitudes, and learning needs, of all students.

#### **First Nation, Métis and Inuit Education Policy Framework**

The new First Nation, Métis and Inuit Education Policy Framework is a key part of the strategy. The framework includes approaches for schools and school boards that will boost Aboriginal student achievement, help close the gap in achievement between Aboriginal and non-Aboriginal students, and improving students' literacy and numeracy skills, training teachers in teaching methods that are appropriate for Aboriginal students, and encouraging more parents to get involved in their children's education or school. The framework also sets out strategies to integrate First Nations, Métis and Inuit cultures, histories and perspectives throughout the Ontario curriculum. This will increase knowledge and awareness among all students.

#### **Plagiarism/Cheating:**

Any incident of plagiarism or cheating will result in a resubmission/rewrite of that particular assignment/test at the end of the course on the student's own time and at his/her own expense to pay for the creation and marking of a new assessment. The incident will be documented in the office. A second incident of plagiarism or cheating in any course will result in a mark of zero for that assignment. For example, if you cheat on a math test and then plagiarize an English essay, you will receive a zero on the essay.

#### **Missed and Late Assignment Policy:**

Teachers will make it Clear to the students and parents/guardian early in the school year that they are responsible not only for their behaviour in the classroom/school but also for providing evidence of their achievement of the overall expectations within the time frame specified by the teacher and in a form approved by the teacher. Students must understand that there will be

consequences for not completing assignments for evaluation or for submitting those assignments late. Where in the teacher's professional judgment it is appropriate to do so, a number of strategies will be used to encourage the student to modify his/her behaviour. Some of these may include:

- Asking the student to clarify the reason for not completing the assignment taking into consideration legitimate reasons for missed deadlines
- Maintaining ongoing communication with students and/or parents about due dates and late assignments, and scheduling conferences with parents if the problem persists
- Setting up a student contract
- Providing alternative assignments or tests/exams where, in the teacher's professional judgment, it is reasonable and appropriate to do so
- Deducting marks for late assignments, up to and including the full value of the assignment

Students and parent/guardians will be informed in a timely fashion via phone call, face to face conference, e-mail and if need be a formal letter about the importance of submitting assignments for evaluation when they are due and about the consequences for students who submit assignments late or fail to submit assignments. **If the above measures have been put into place and the behaviour of the student has no provided sufficient evidence, then 0 will be inserted as the mark for the missed assignment.**

### **Resources:**

Growing Success: Assessment Evaluation and Reporting in Ontario Schools, First Edition  
Covering Grades 1-12

Biology 12, McGraw-Hill Ryerson, 2012  
Nelson Virtual Labs

### **Attendance Policy:**

Consistent log-in is crucial to a student's success in Toronto World School's online program. The guidelines of the Ministry of Education require that students receive at least 110 hours of scheduled instruction time for each credit course. Attendance patterns will be monitored to ensure a student is actively logging into their course. Students who have not completed the course within 12 months of enrolment will be automatically removed from the course. Only under extenuating circumstances, with proper documentation and the permission of the Principal, can a student be reinstated.

### **Acceptable Online Use Policy**

Toronto World School uses the ConnectED Integrated Learning Platform and is intended for educational purposes only. The use of this program or any tools within TWS systems, other than for educational purposes, is strictly prohibited. The

inappropriate uses include, but are not limited to, criminal, obscene, commercial, cyber-bullying or illegal purposes.

The administration has the right to review all student work in order to determine the appropriateness of computer use. If TWS online programs are deemed to be used inappropriately, the Administration will levy consequences which may include suspensions and/or removal from the program. In some cases, further action may be taken including contacting day schools, legal representation or the police.

Students need to be very vigilant in order to prevent them getting into a situation where they may be suspected for inappropriate use.

Therefore, students are reminded to

- Always protect their passwords and not share them with anyone
- Always inform their teachers of suspicious messages or other incidents that they encounter
- Always only access content that is intended for educational use.

### **Hardware/software requirements:**

#### *Hardware:*

- PC running Windows 8 or higher
- Mac running Apple OS X or higher
- Chromebook running Chrome OS

*High speed internet is recommended with access to a computer with the following:*

- A processor of 2GHz or faster
- 4 GB RAM or greater
- A high speed internet connection of 1.5 MB/s or faster
- Keyboard and mouse
- Headphone/Speakers/Microphone/Camera

#### *Recommended Software:*

- Adobe Reader, Shockwave, Flash Player, Java, Office suite

#### *Browser:*

- Mozilla Firefox 4 or higher, Internet Explorer 7 or higher, Safari 5 or higher, Google Chrome 11 or higher